Discussion on "Fabrication of the AAA β=0.175 Spoke Resonator" by Dale Schrage

The discussion started with the comparison of methods to insert spokes into the cavity body. Shepard suggested to make the choice dependent on the achievable alignment tolerances, especially for multigap spoke resonators, where the alignment of succeeding beam holes is an added complexity. Schrage pointed out that the importance of this issue depends on the beam-current and thus the related aperture size. Tolerances should not be over restricted, if cost is an issue.

The rest of the discussion focused on the issue of niobium sheet quality. The niobium sheets that LANL used for APT and AAA in recent years came from three different vendors. They all were only inspected by dumping into DI-water and by visual inspection. Zanon redid the visual inspection when they were provided with the niobium for the LANL spoke resonators. Eddy current methods, like used by TESLA are not available in most places. LANL is well aware of the risk taken by limiting inspections to the two steps mentioned. In the future eddy current testing might have to be added to the QC plans.

Pagani mentioned that for TESLA rejections of sheets due to eddy-current inspections have dropped over the years, as vendors became more experienced in avoiding contaminations in the materials. He also pointed out that for the very high fields in TESLA (up to 50 MV/m peak surface fields) the results of these inspections are not relevant anymore to detect problematic defects. While eddy-currents can detect defects down to 100 μm, at these high fields much smaller defects are already performance limiting. Shepard pointed out that materials are handled in many steps and there can never be too much testing. Especially a 48 hour dump into DI-water at an early stage can identify fabrication issues.